Basic SkyWarn Spotter Training

National Weather Service

Mount Holly, NJ

Things to take away from the training:

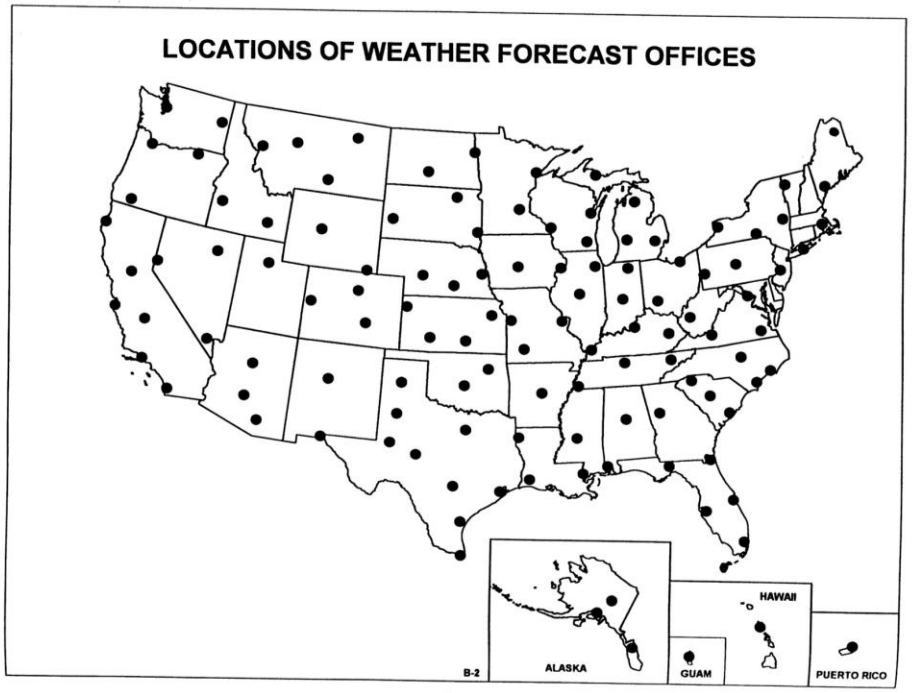
- Who we are and What we do.
- Why and How we do things.
- Why we need spotters.
- How spotters are activated.
- What weather phenomena to look for.
- What and how to report.
- Importance of your report.
- Local county and NWS points of contact.

Who we are.

- Federal agency working for the Department of Commerce.
- Made up mostly of college degreed meteorologists, but have IT support staffers, electronic technicians and administrative support system.
- Just a bunch of weather nuts/nerds who love what they do.

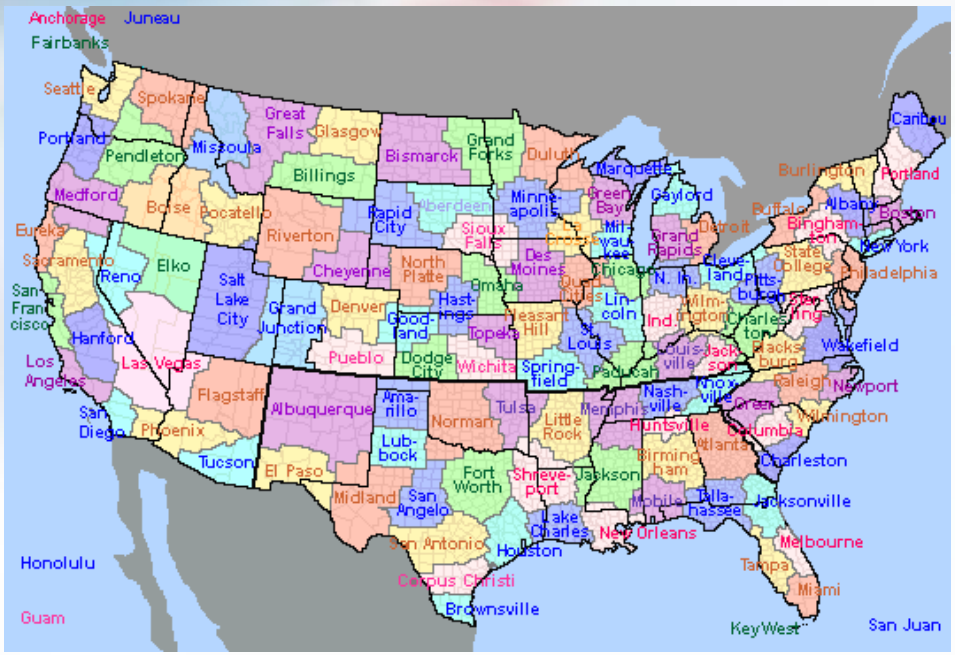
NWS Mount Holly Personnel

- Senior Forecasters : 5
- General Forecasters: 5
- Meteorological Interns: 4
- Electronic Technicians: 3
- Hydrologist: 1
- Management: 5
- IT position: 1
- Administrative support:1
- Total Personnel: 25



The Mount Holly Forecast Office is 1 of 122 field offices across the United States including overseas territories.

The Mount Holly County Warning Area (CWA) has the second largest population in the NWS with over 11 million people throughout four different states.



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What we do.

Public Forecasts

- 34 Counties in four States
- 5 separate coastal zones

Hydrologic Forecasts

- 150 non-tidal observation platforms
- 50 forecast points
- Over 9000 sub-basins
- 40 Tidal gage observation platforms

Aviation Forecasts

- 8 Terminal Forecasts

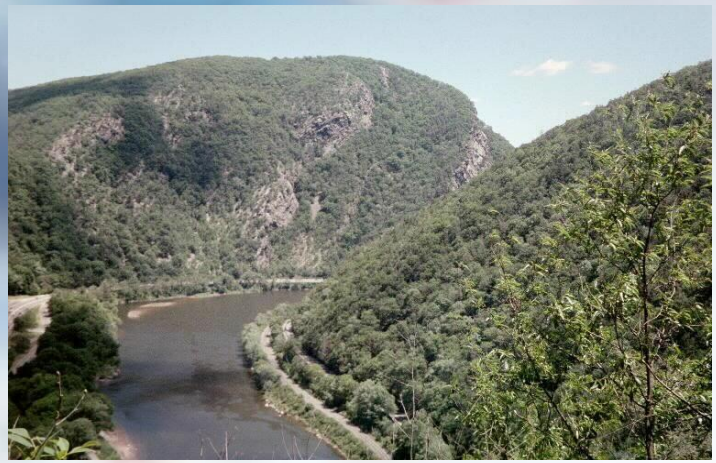
Marine Forecasts

- Sandy Hook NJ to Fenwick Island DE
- Entire Delaware Bay
- Surf Zone forecasts

Fire Weather Forecasts

- 5 forecast zones in 4 States

- Issue forecasts for four states with a very diverse topography.



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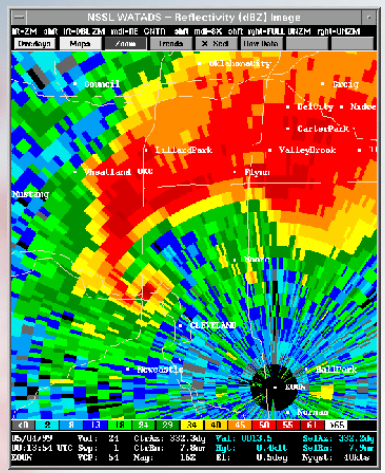
Why we do what we do.

- ***The National Weather Service Produces Weather, Water, and Climate Forecasts and Warnings:***
  - To Protect Life and Property for All Americans
  - To Enhance the National Economy



- ***Data and Products to:***
  - Government Agencies
  - Private Sector
  - The Public
  - Global Communities

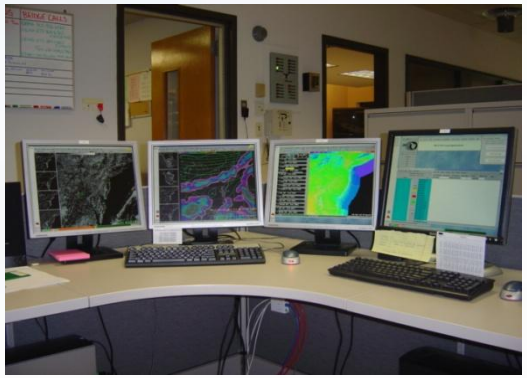
How we do it.

• Staff our office 24/7/365 as we are considered emergency personnel.

•Use a series of servers with live data stream known as AWIPS (Advanced Weather Interactive Processing System).

•Work rotating shifts that change weekly.

•Only federal agency allowed to issue weather warnings/advisories

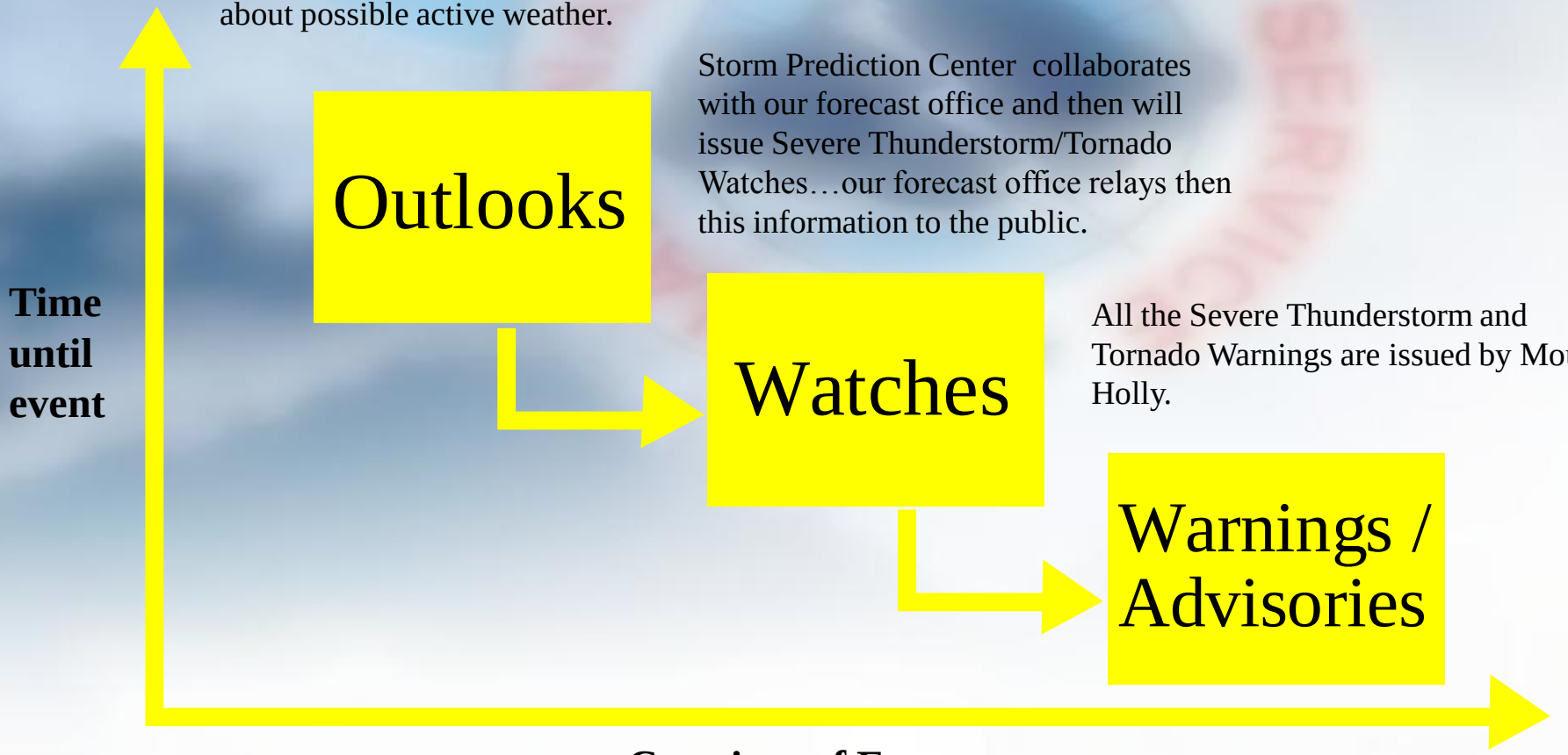


Tiered Approach of NWS Products

Storm Prediction Center will issue Severe Weather outlooks; our forecast office issues a Hazardous Weather Outlook that will contain information about possible active weather.

Storm Prediction Center collaborates with our forecast office and then will issue Severe Thunderstorm/Tornado Watches…our forecast office relays then this information to the public.

All the Severe Thunderstorm and Tornado Warnings are issued by Mount Holly.



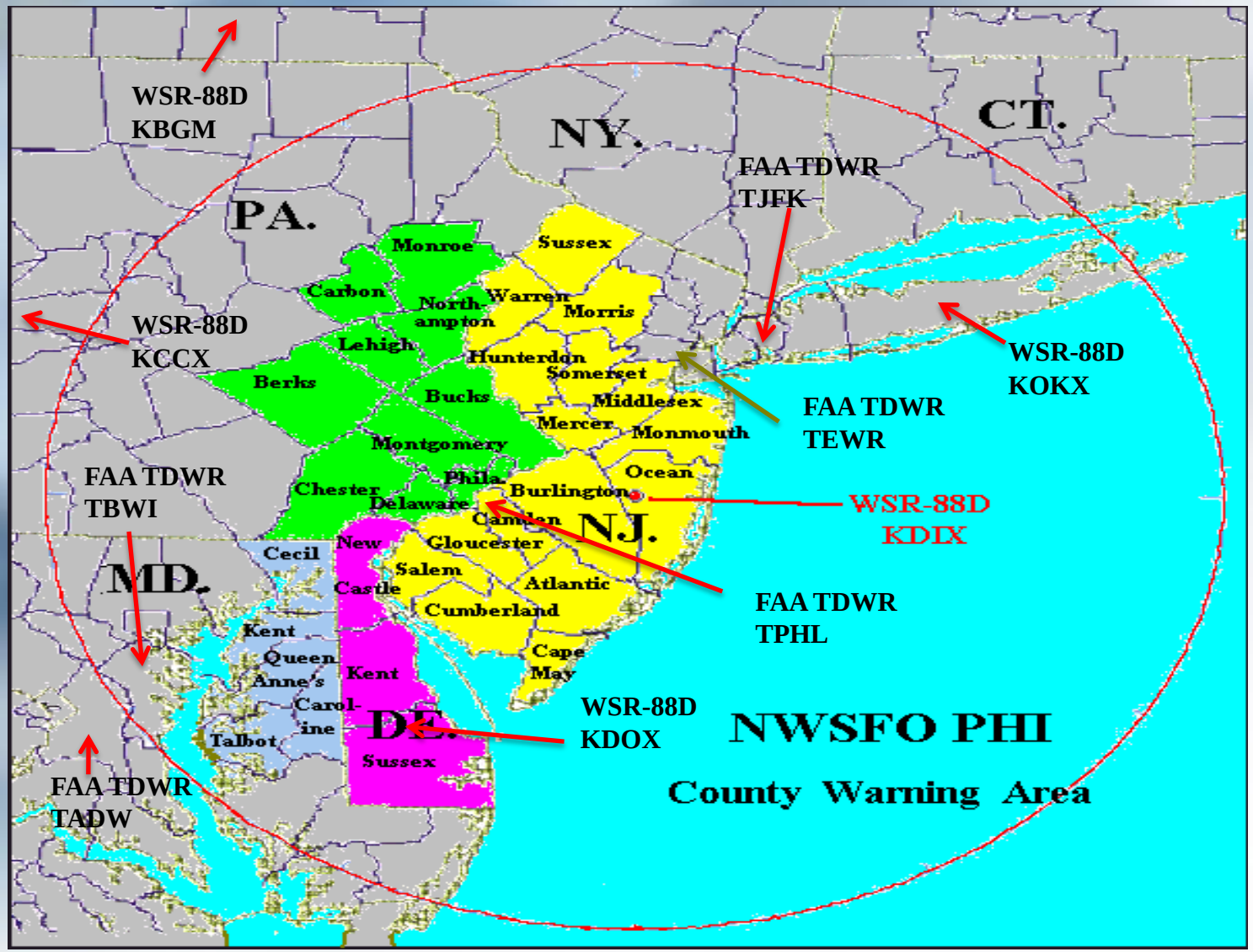
Why we need spotters

•Radar limitations (beam height & resolution…effective resolution decreases with distance...radars do not see tornadoes)

•Very high percent of weak tornadoes (radar signatures less defined)

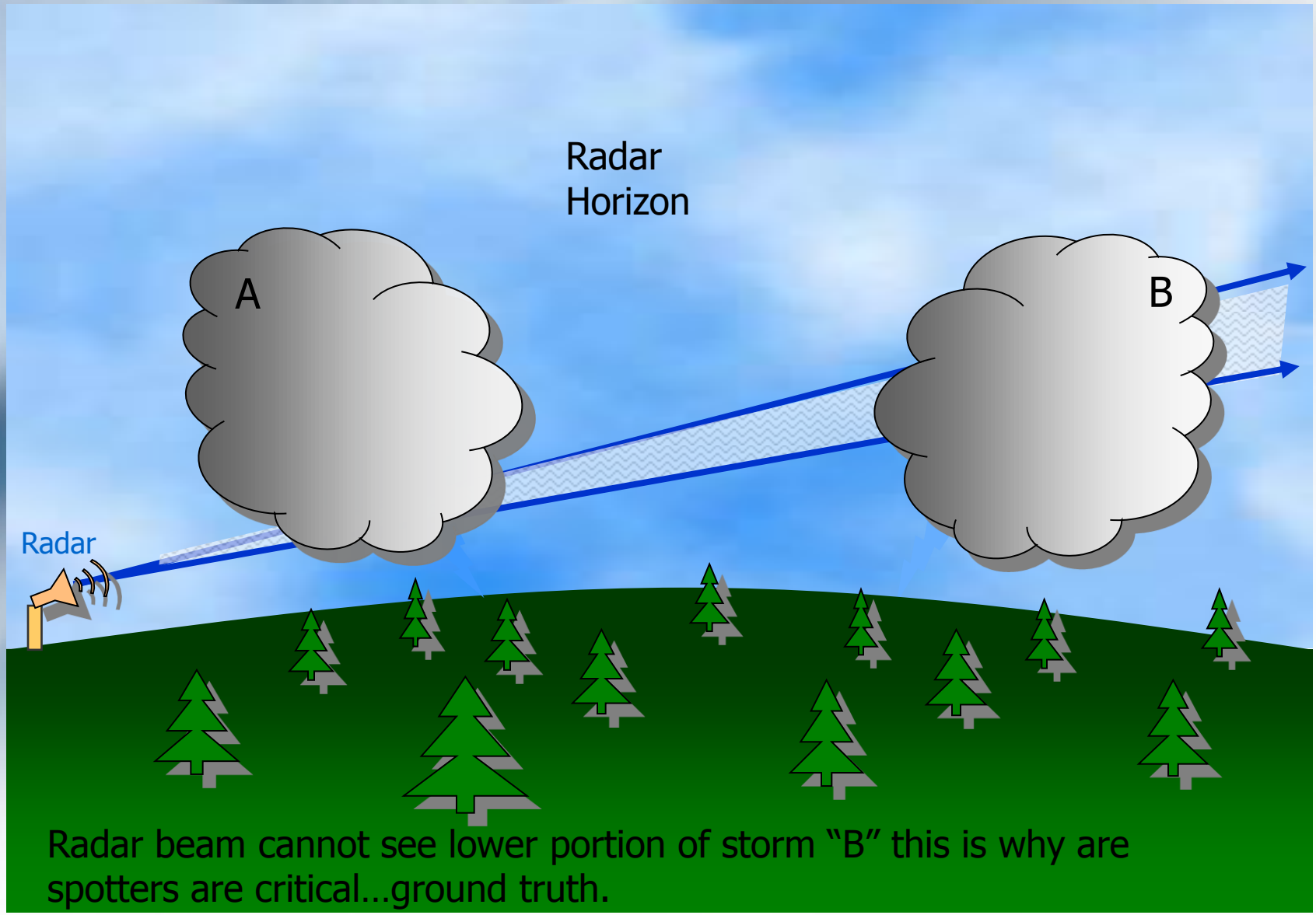
•Real-time verification (adds credibility, enhances public response, and improves warning accuracy)

•Eyes and Ears for NWS throughout CWFA



Our CWA has great radar coverage from every direction, but we still ground truth reports during active weather…We are only as good as the information in which we receive.

Why we need spotters



Radar beam cannot see lower portion of storm "B" this is why are spotters are critical…ground truth.

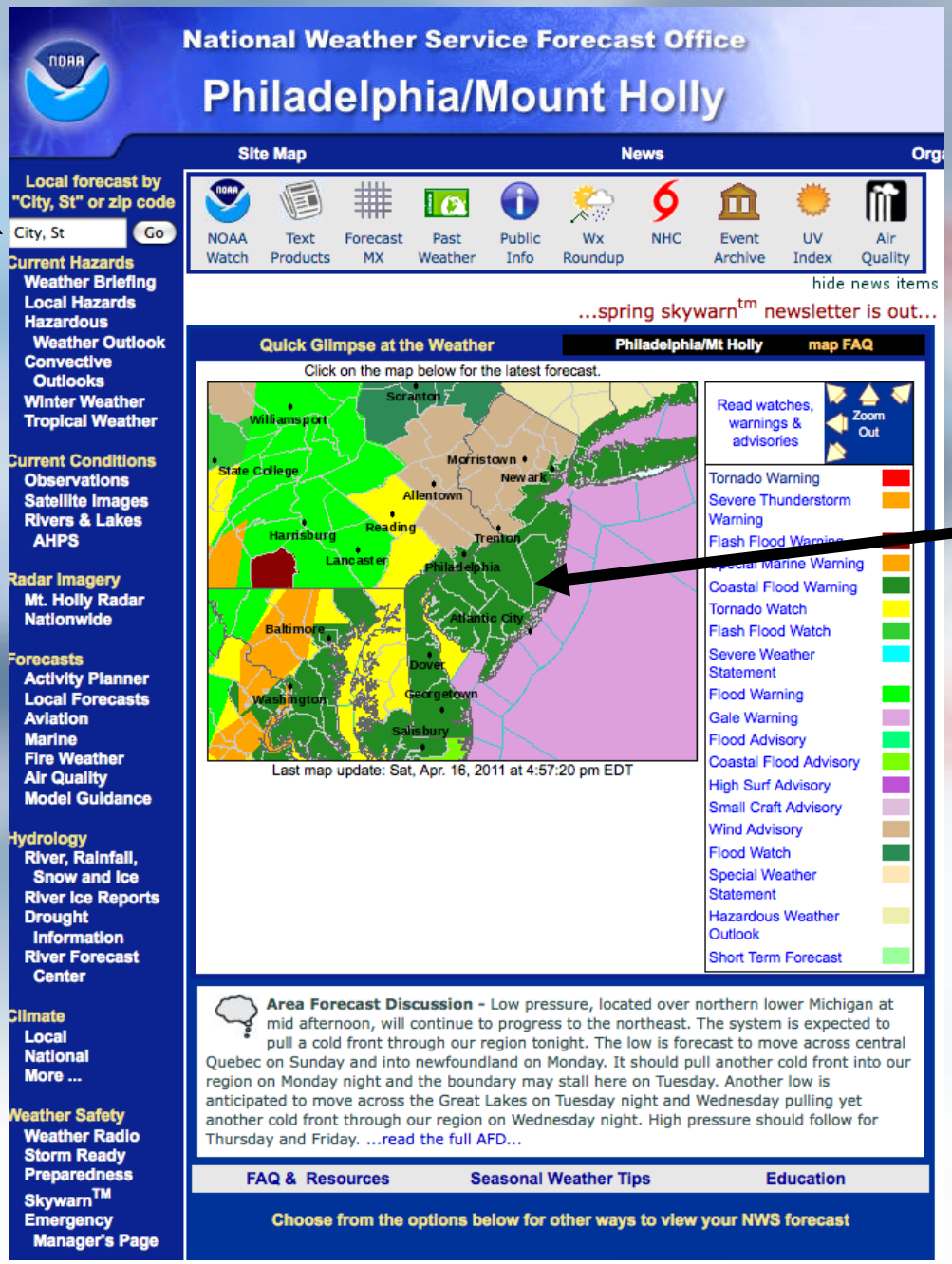
Watch vs. Warning

- Watch - Atmospheric conditions are favorable for the development of severe thunderstorms/tornadoes which could produce severe weather – remain alert and watch the sky.

- Warning - Severe weather is occurring or is imminent – take protective action.

How to Obtain Watches/Warnings and to Become Activated

Use your zip code or city and state.



Be careful where you click!

www.weather.gov/phi

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NOAA Weather Radio All Hazards

www.weather.gov/nwr

Broadcasts are found in the public service band at these seven broadcast frequencies (MHz):

162.400 MHz	***162.425 MHz***	***162.450 MHz***	***162.475 MHz***	***162.500 MHz***	***162.525 MHz***	***162.550 MHz***

NOAA Weather Radio

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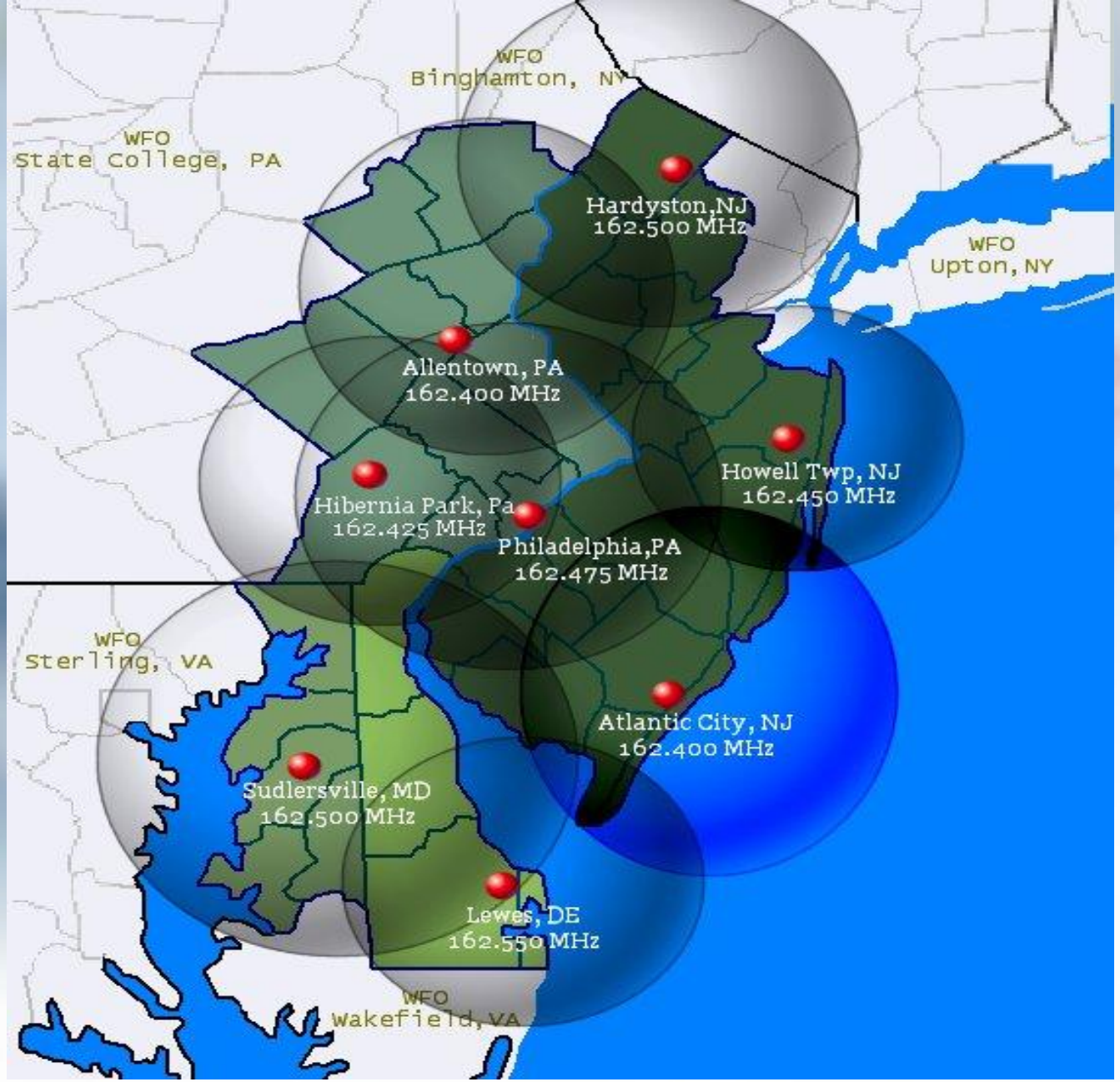

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Other ways to receive activation notice

- Join SkyWarn listserv: mthollyskywarn@yahoogroups.com
- Sign up for text updates: http://inws.wrh.noaa.gov/ (experimental)
- Experimental RSS (Really Simple Syndication) feeds: http://www.nws.noaa.gov/alerts-beta/

Weather to Watch for

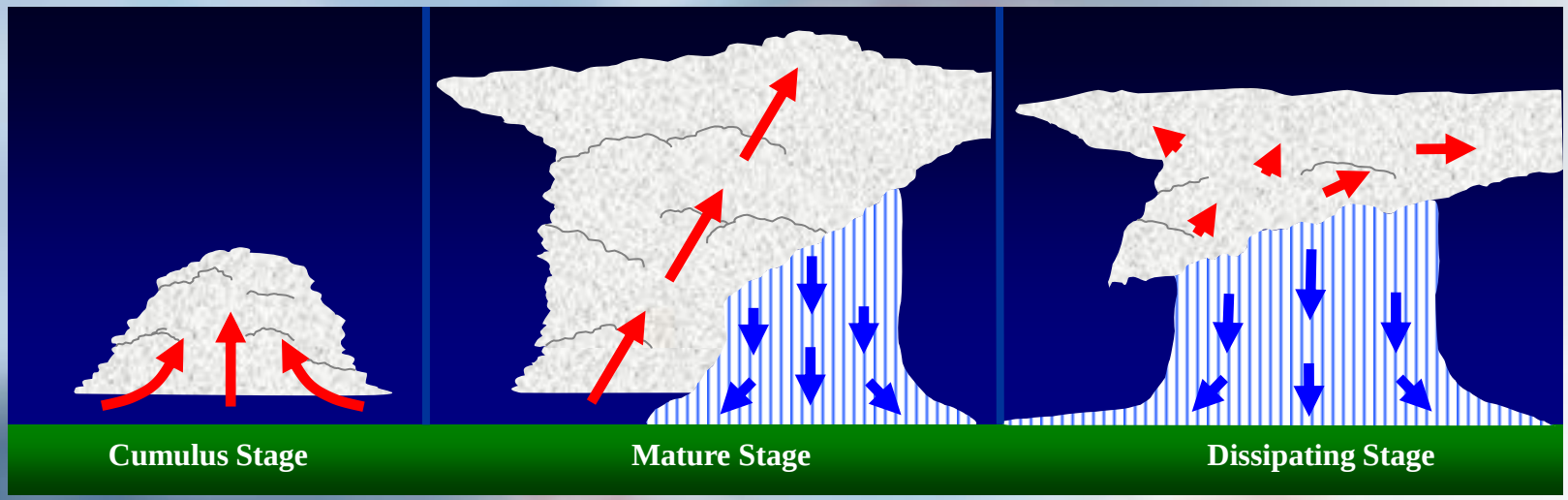
- Thunderstorms (Ordinary and Severe)
- Strong Winds
- Tornadoes
- Hail
- Flash Flooding
- Lightning (Not a descriptor for severe weather)
- Snowfall/Ice

Thunderstorms

Thunderstorms

- Process which takes heat and moisture at the surface and lifts it into the upper regions of the atmosphere.
- There are an estimated 2000 thunderstorms in progress at any given moment.
- Less than 1% of all thunderstorms become severe, i.e. inch hail, strong winds, tornadoes.
- Thunderstorms producing severe weather can occur any place at any time, with the right ingredients.

Thunderstorm Life Cycle

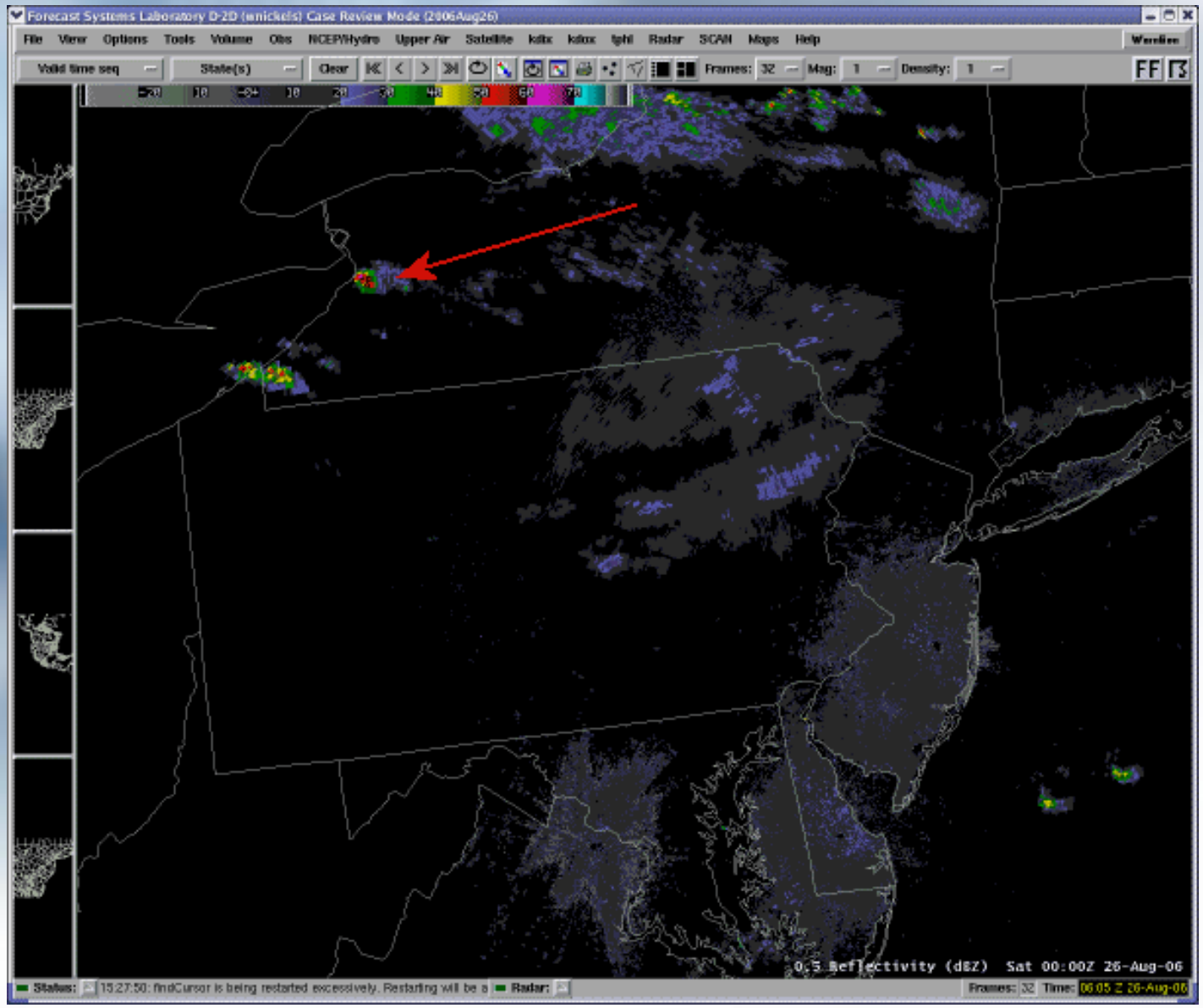


We are most concerned with the mature and dissipating stages in regards to severe weather potential.

Severe Thunderstorm Criteria

- Three criteria exist:
  - Winds 58 MPH (50 KTS) or Greater
  - Hail 1 inch in Diameter Hail (Quarter Size) or Larger
  - Tornado

Supercell Moving from Buffalo to Atlantic City



August 26, 2006

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Tornadoes

Dimmitt, TX June 2, 1995, Most studied tornado in history…rated an F4.

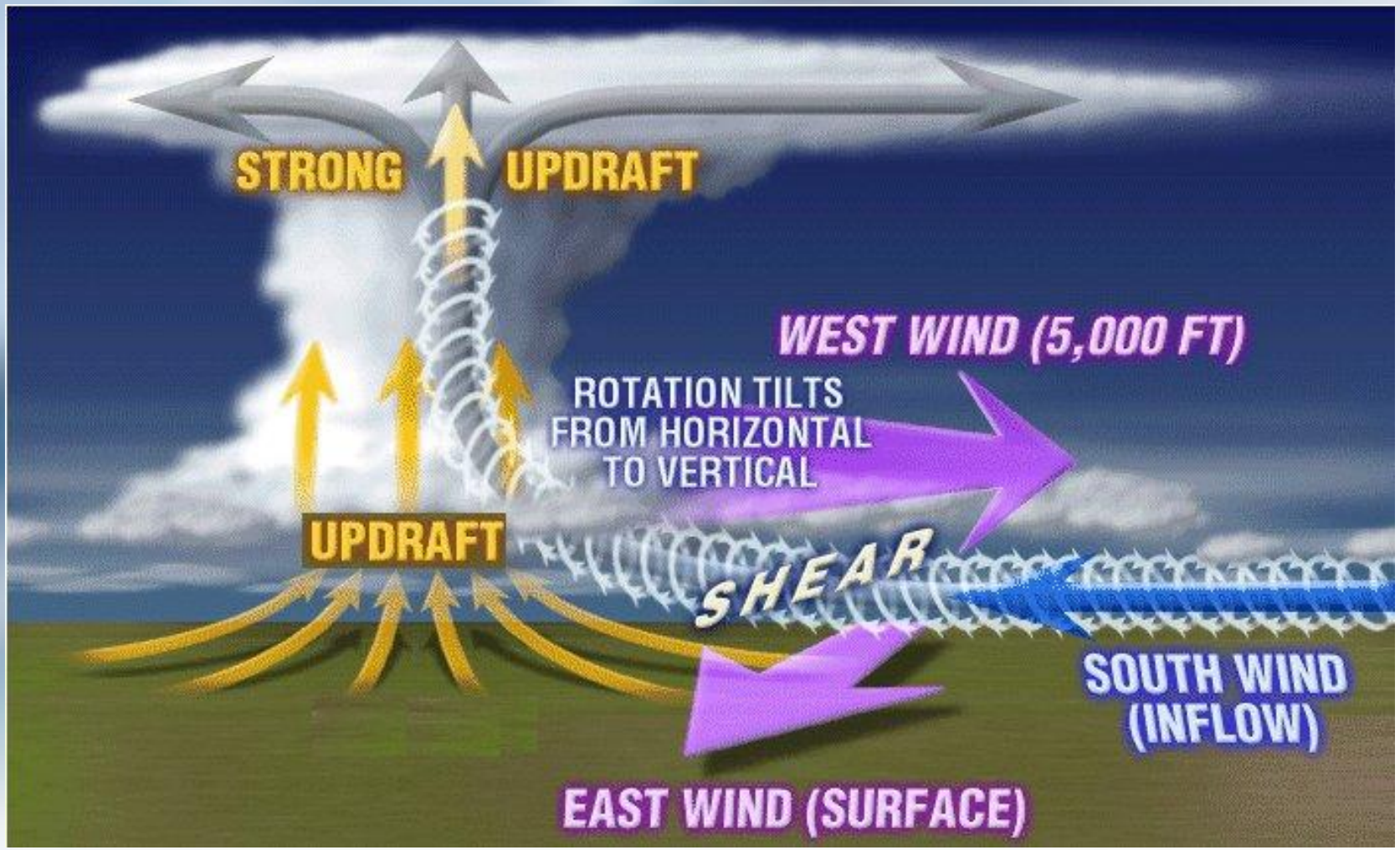
Tornadoes

- A violently turning column of air pendant from a thunderstorm cloud and in contact with the ground.

- In Mid-Atlantic region, more common in spring and summer months, but can occur anytime of year.

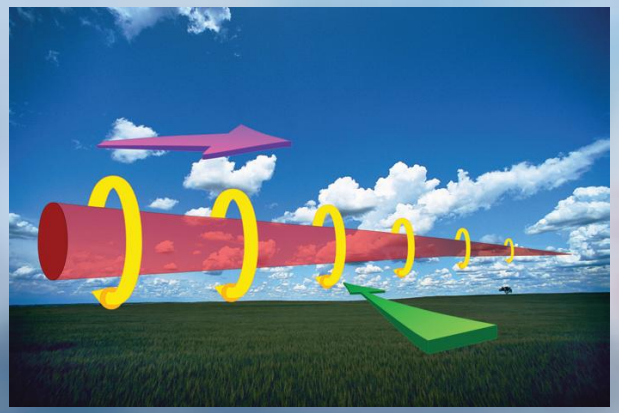
- Rated by estimated wind speed (Enhanced Fujita scale) with EF0 the weakest, EF5 the strongest. Most common tornadoes in Mid-Atlantic region: EF0, EF1.

How they form

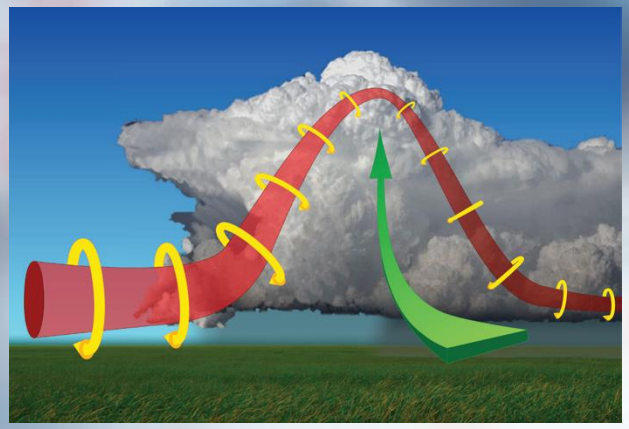


Supercell Thunderstorms – Strong Instability and Shear

How they form



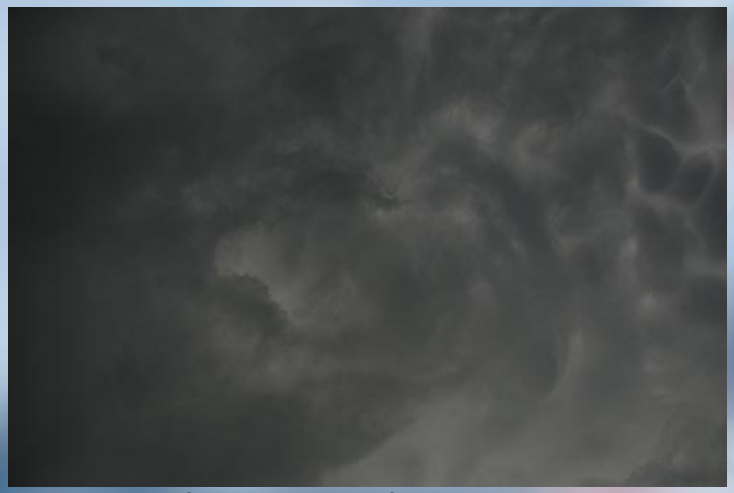
Before thunderstorms develop, winds change direction and increase in speed with altitude (wind shear). This creates an invisible, horizontal effect in the lower atmosphere.



Rising air within the thunderstorm updraft tilts the rotating air from the horizontal to the vertical.

An area of rotation, 2 to 6 miles wide, now extends through much of the storm. Most tornadoes form within this area of strong rotation.

Tornadoes, what to look for



Look for swirling of clouds, with the approach of thunderstorm.

Lowering of cloud base…wall cloud.

Funnel cloud…does not touch the ground.

Depending on line of vision, could see a moving debris cloud on the ground.

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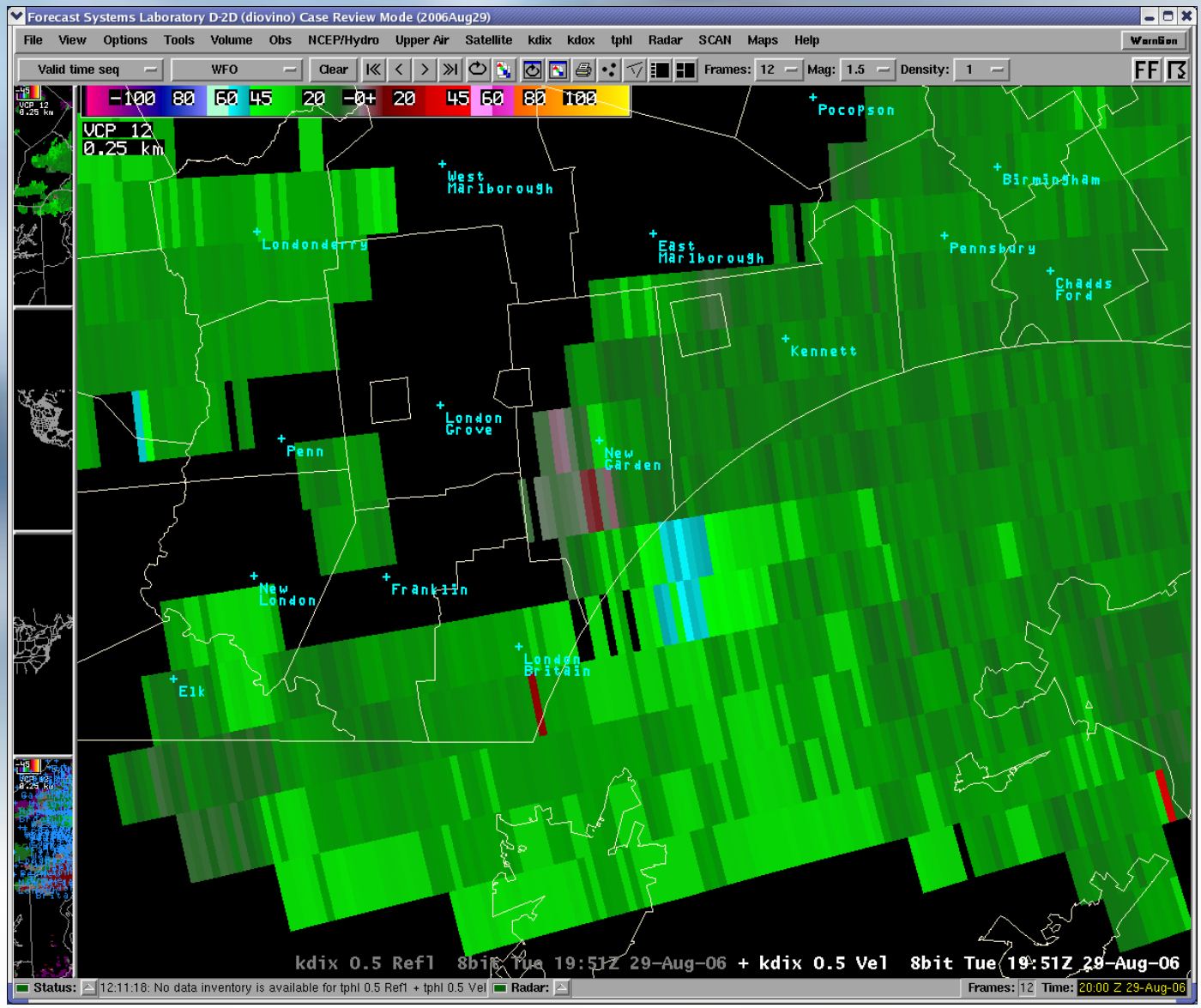
A tornado signature on radar.



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EF0 and EF1 Tornadoes

- Weak Tornadoes
  - 80% of all tornadoes
  - Less than 5% of tornado deaths.
  - Lifetime 1-10 minutes.
  - Path length up to 3 miles
  - Wind speed 60 to 115 mph.

EF2 and EF3 Tornadoes

- Strong Tornadoes
  - 19% of all tornadoes
  - Less than 30% of tornado deaths.
  - Last 20 minutes or longer
  - Path length 15+ miles.
  - Wind speed 110 to 205 mph.

EF4 and EF5 Tornadoes

- Violent Tornadoes
  - Account for only 2% of all tornadoes but result in 70% of all tornado deaths.
  - Path length 50+ miles.
  - Wind speed over 205 mph
  - Lifetimes can exceed one hour.

Enhanced Fujita Scale (Tornado Rating System)

Enhanced Fujita Scale		
Category	**Wind Speed**	**Potential Damage**
EF0	105–137 km/h 65–85 mph	Light damage. Peels surface off roofs; some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; mobile homes pushed off foundations or overturned; sign boards damaged.
EF1	138–179 km/h 86–110 mph	Moderate damage. Roofs torn off frame houses; windows and glass doors broken; moving autos blown off roads; mobile homes demolished; boxcars overturned.
EF2	180–217 km/h 111–135 mph	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	218–266 km/h 136–165 mph	Severe damage. Some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	267–324 km/h 166–200 mph	Devastating damage. Well-constructed houses and whole frame houses completely leveled; structures with weak foundations blown away some distance; trees debarked; cars thrown and small missiles generated.
EF5	>324 km/h >200 mph	Incredible damage. Strong frame houses leveled off foundations and swept away; with strongest winds, brick houses completely wiped off foundations; automobile-sized missiles fly through the air in excess of 100 m (109 yd); cars thrown and large missiles generated; incredible phenomena will occur.

Tornado Damage

Rising Sun, MD 2003

Lyons, PA 1998

Wilmington, DE 2004

Wantage, NJ 2009

Tornado Myth

- Myth – We should open our windows if a tornado approaches to help equal out the inside pressure.

Answer

- **FALSE!**

- Truth – Stay away from windows if a tornado approaches. If your windows are closed, leave them closed. Your house will not explode due to the decrease in pressure within the tornado. If the tornado is close enough to your house that it experiences a significant and rapid drop in pressure, chances are the wind and debris will have damaged or destroyed your house before the minimum drop in pressure occurred.

Tornado Myth

- Myth - I heard a loud noise and it sounded like a train…it had to be a tornado.

Answer

- **FALSE!**

- Truth - Any very strong wind will make a "roaring" noise or sound like a train – the sound depends on the wind speed, local terrain, obstructions to flow, and atmospheric conditions.

Tornado Myth

- Myth - The wind twisted the metal on my shed…the trees that were blown down are twisted…it had to be a tornado.

Answer

- **FALSE!**

- Truth - One generally cannot look at any individual object to determine if the damage was caused by a tornado or straight-line wind. The total damage pattern and how the debris is strewn in relation to other debris is a better indicator of the causative effect. A straight-line wind can cause an object to twist as the destructive force of the wind on an object can cause uneven stress loads with different failure points.

Tornado Myth

- Myth – It is safe to seek shelter from a tornado under an overpass.

Answer

- **FALSE!**

- Truth – Overpasses are not a safe place to take shelter. They can funnel the wind flow and increase the strength of the wind. They do not provide protection from flying debris. In addition, parking your car under or near an overpass creates a hazard to other motorists trying to pass through the area. Virtual traffic jams have been created by motorists gathering under an overpass.

Tornado Safety in Your Vehicle

- Do not try to outrun a tornado.
- Abandon your vehicle immediately and seek shelter in a nearby ditch or low area, but be cautious of flood-prone areas.
- Protect your head from flying debris.

Scud Clouds

- A type of low, detached, irregular cloud found beneath cumulonimbus clouds.
- Often ragged or wispy in appearance
- Often are mistaken for a developing tornado.
- Difference is determinable by identifying if there's any rotation (not just movement)

Straight-line Winds (Downburst)

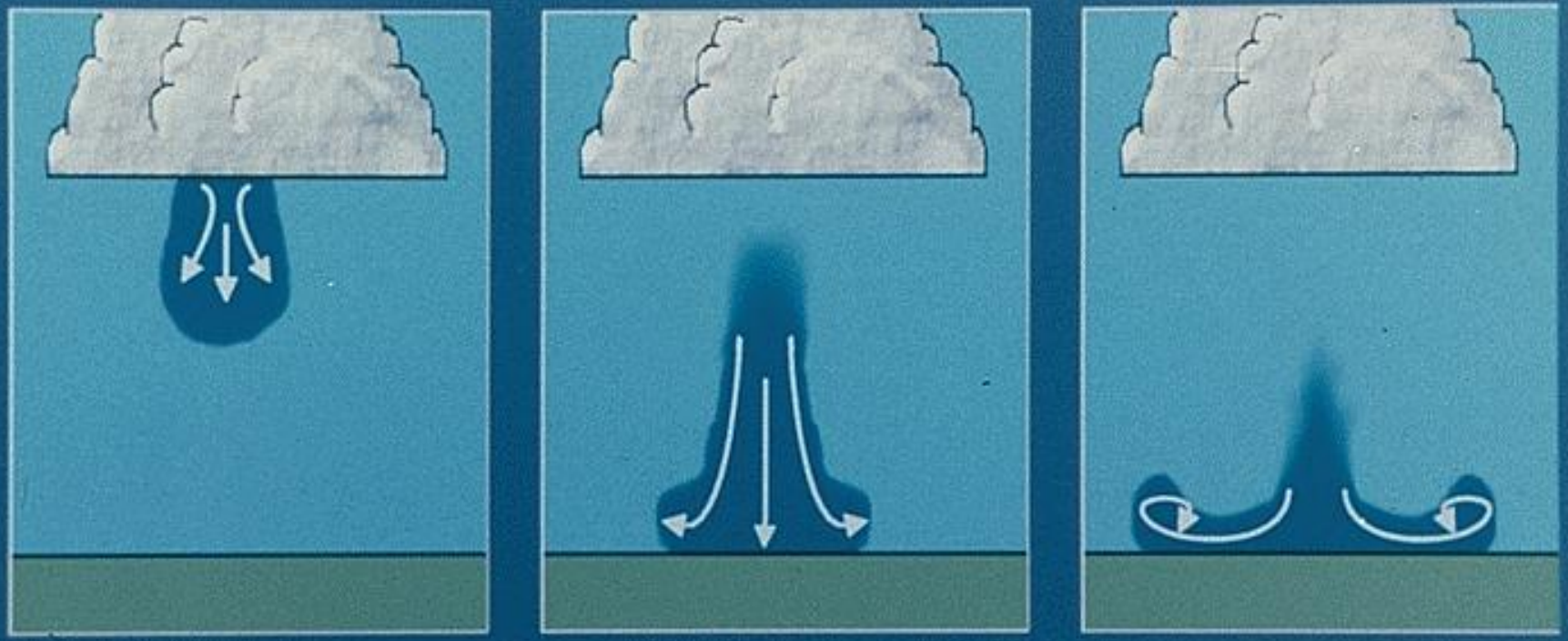
Leading edge of gust front is found underneath the shelf cloud.

Straight-line Winds (Downburst)

- Severe winds are usually generated by the thunderstorm's downdraft.
- These strong winds often are confused for a tornado.
- These winds blow from one direction and do not swirl.
- Damage caused by these winds falls in one direction.
- Winds can gust upwards of 100 mph.

Wet Microburst

Downburst Life Cycle



FORMATION - Evaporation and precip. drag forms downdraft

IMPACT - Downdraft quickly accelerates and strikes ground

DISSIPATION - Downburst moves away from point of impact

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In case you don't have an anemometer

Wind Speeds

- 25 - 31 mph
  - Large Branches in motion; whistling in telehpone wires
- 32 - 38 mph
  - Whole trees in motion
- 39 - 54 mph
  - Twigs break off of trees; wind impedes walking
- 55 - 72 mph
  - Damage to chimneys and TV antennas; pushes over shallow-rooted trees
- 73 - 112 mph
  - Peels surface off roofs; windows broken; mobile homes overturned
- 113+ mph
  - Roofs torn off homes; weak buildings and mobile homes destroyed; large trees uprooted

Hail


THE UNITED STATES OF AMERICA
IN GOD WE TRUST
TWENTY DOLLARS
20

Hail

- Frozen water droplets that congeal together.
- Severe hail is 1” in diameter or larger (size of a quarter)
- Form within a very strong thunderstorm updraft.
- Large hail stones can fall at speeds 100 mph or faster.
- Causes more than a BILLION dollars in damage to property and crops every year.

Hail

- Try to estimate size or use a ruler to measure .
- Can make your own hail pad.
- Do NOT relate hail size to marbles since they come in different sizes.

Hail from LaPlata, MD Tornado (F4): April 28, 2002

Hail Damage to Field Corn – Lebanon County PA – July 1, 2004

Muncy, PA

Hail Size Estimates

Pea Size
- ✓ 0.25”

Penny/Dime
- ✓ 0.75”

Nickel
- ✓ 0.88”

Quarter (Severe)
- ✓ 1.00”

Half Dollar
- ✓ 1.50”

Golfball
- ✓ 1.75”

Hen Egg
- ✓ 2.00”

Tennis Ball
- ✓ 2.50”

Baseball
- ✓ 2.75”

Grapefruit
- ✓ 4.00”

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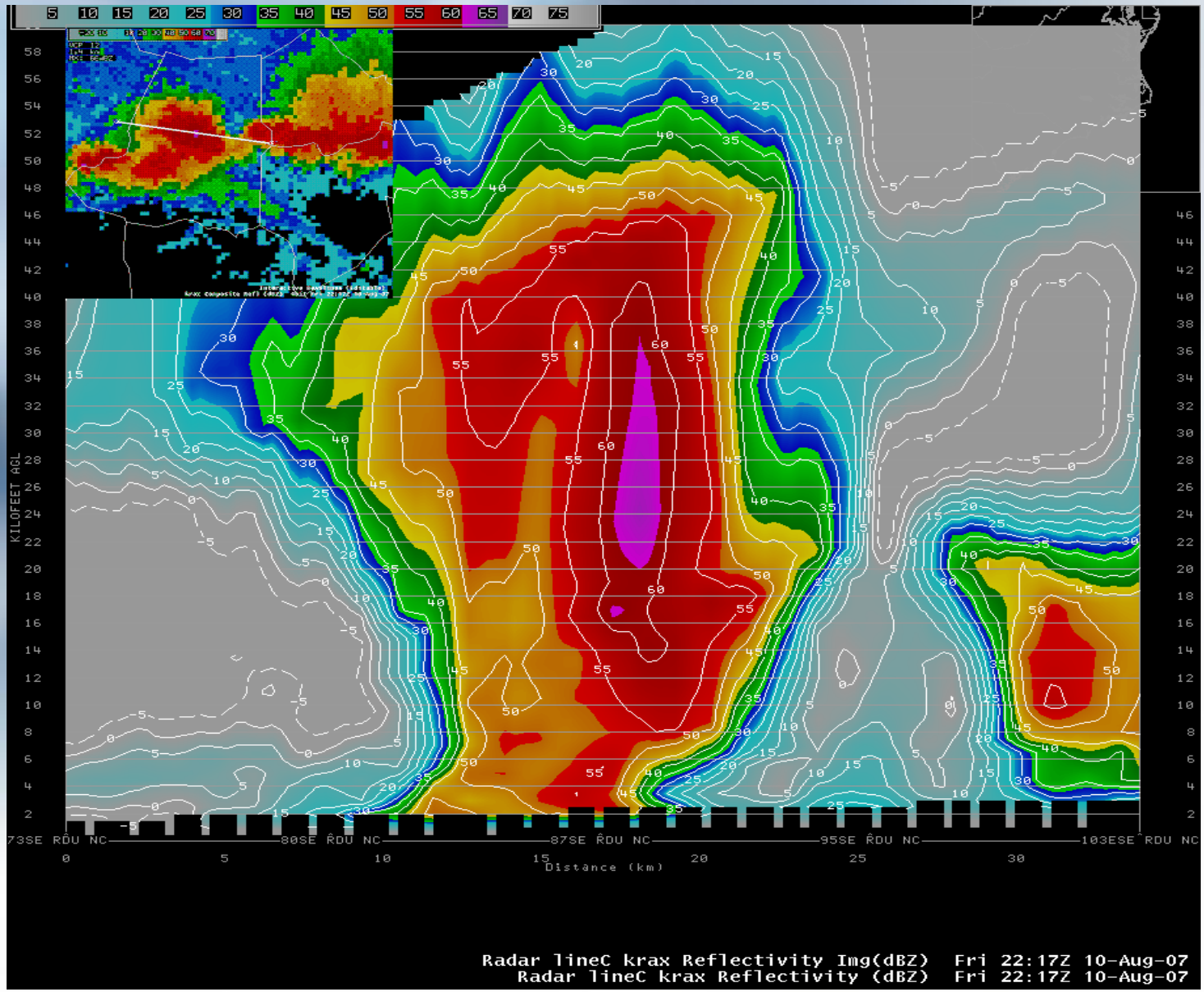
Hail core in a thunderstorm



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Flash Flood

Flash Flooding

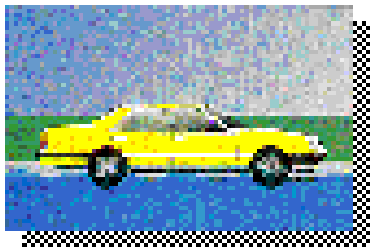
- Number ONE weather related killer.
- Rapid rise of water levels to flooding conditions within six hours of the causative event.
- Causative events
  - Heavy Rain
  - Ice Jam (formation or break)
  - Dam Break
- Can be highly localized
- Significant amount of rainfall in a short period of time…threshold amounts vary across region.

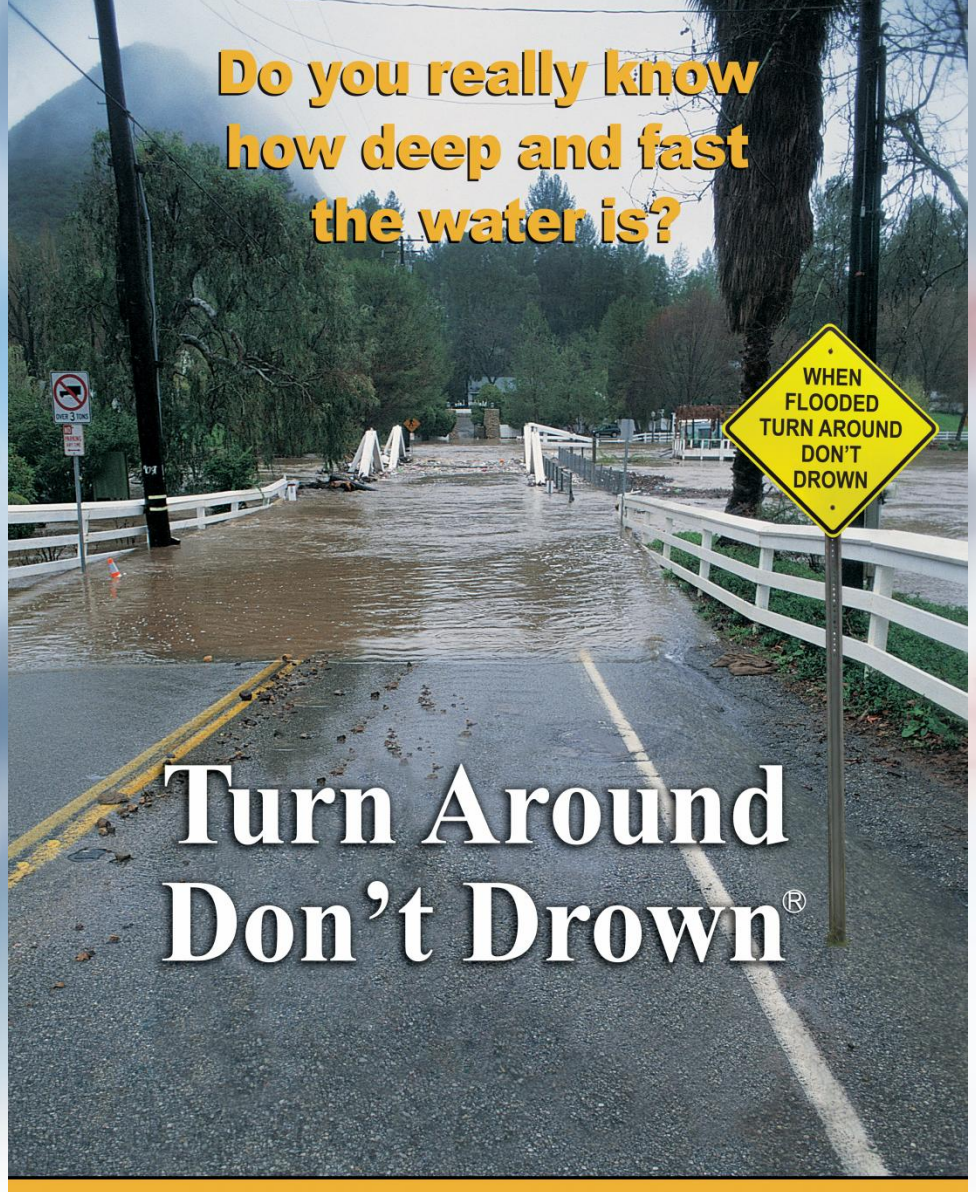
Flash Flooding cont.

- Cause rivers and streams to swell above their banks.
- Inundate low lying areas.
- Can completely wash roads out.
- Can affect downstream locations miles away from where rainfall actually occurred.

Flash Flood Safety

- Do not drive into or through flooded roads, underpasses, or low spots, or over bridges covered by water. The water may be too deep to allow safe passage of your vehicle.
- Abandon your car immediately if your vehicle becomes caught in rising water. A water depth of only one foot is enough to cause cars to become buoyant and be swept away. Most flash flood deaths occur in automobiles.
- Do not attempt to outrun a flash flood on car or on foot.
- If water threatens, move to higher ground immediately.
- Evacuate your home or business if necessary.
- Flash floods can occur at night... be extra cautious.
- Flash floods are especially rapid in hilly or mountainous terrain.



For important, life-saving information please visit

http://tadd.weather.gov

National Weather Service

U.S. Department of Transportation
Federal Highway Administration

AAMVA American Association of Motor Vehicle Administrators

Strengthening Homes and Safeguarding Families
FLASH
FEDERAL ALLIANCE FOR SAFE HOMES
www.flash.org

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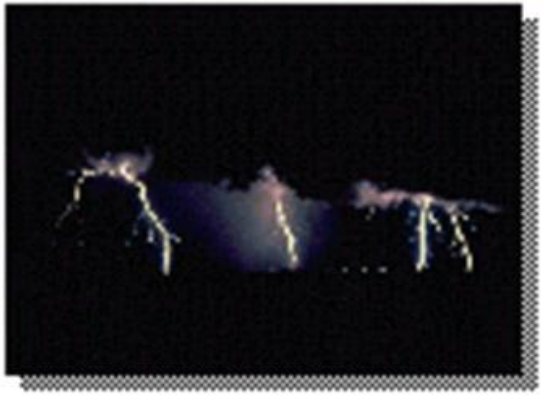
Lightning

Lightning

Lightning



- Second Leading Weather-Related Killer
  - Although, most people struck by lightning live, but may have recurring health problems!
- Lightning Can Strike Many Miles from the Storm
  - Often known as the "Bolt from the Blue"
- If You Can Hear the Thunder, you are Close Enough to be Struck!

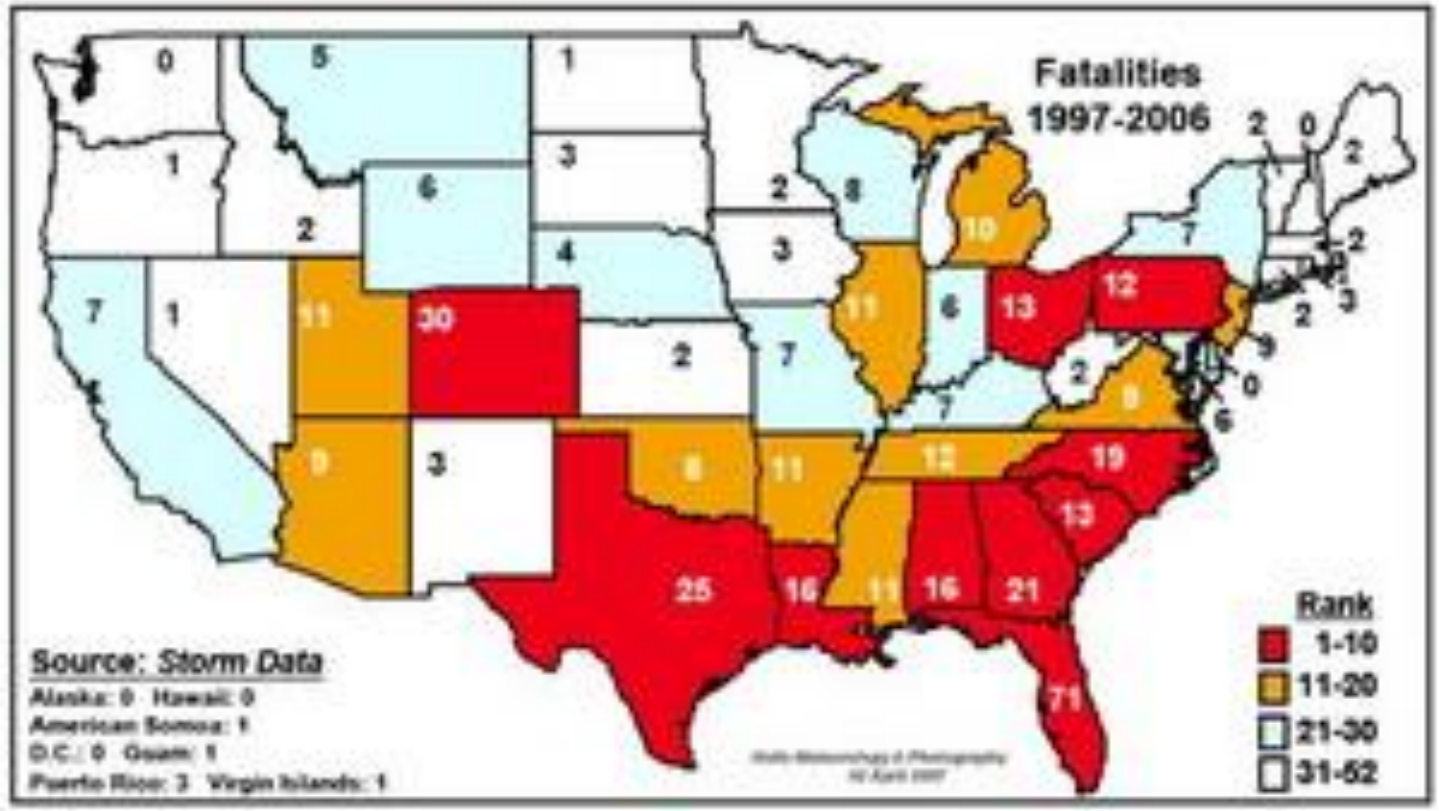
Lightning Continued

Lightning Deaths by Location

- Under Trees
- Water Related (Fishing, Boating, Swimming)
- Open Fields (Ball park, playground)
- Farm and Road Equipment
- Radios & Telephones
- Other or unknown locations

- **Four** times hotter than the surface of the sun
  - 50,000 °F
- **100 million to one billion volts**

Lightning Deaths by State, 1997 to 2006



Go and stay inside for at least 30 minutes before venturing outside after the last flash or clap of thunder.

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WINTER WEATHER

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Winter Weather

- Watch/Warning for Snow:
  - Average of 6 inches in northern NJ and most of PA
  - 4 inches in southern NJ and Phl and Del Counties in PA and on the Delmarva

- Advisory for Snow:
  - Average of 4 inches in Northern NJ and most of PA
  - 3 inches in southern NJ and Phl and Del Counties in PA
  - 2 inches on the Delmarva

- Blizzard Warning:
  - Winds 35 mph or higher and
  - Visibilities less than 1/4 mile

Winter Weather (continued)

- Watch/Warning for Ice:
  - 1/4 inch accumulation or greater anywhere in the Mount Holly CWFA.

- Advisory criteria:
  - Any accumulation up to 1/4 inch.

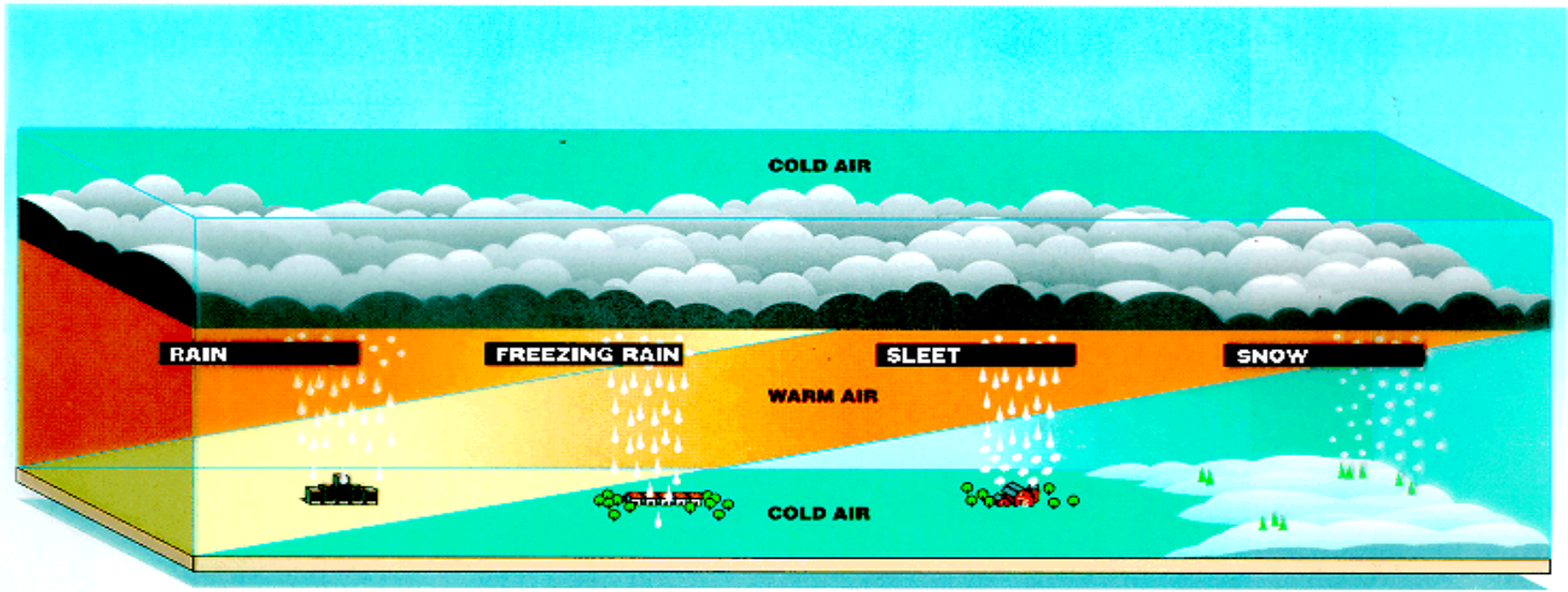
Winter Weather (continued)

- High Wind Watch/Warning Criteria:
  - 40 mph or higher sustained winds or
  - wind gust up to 58 mph for one hour or longer

- High Wind Advisory Criteria:
  - 31 to 39 mph or higher sustained winds or
  - wind gust 46 to 57 mph for one hour or longer

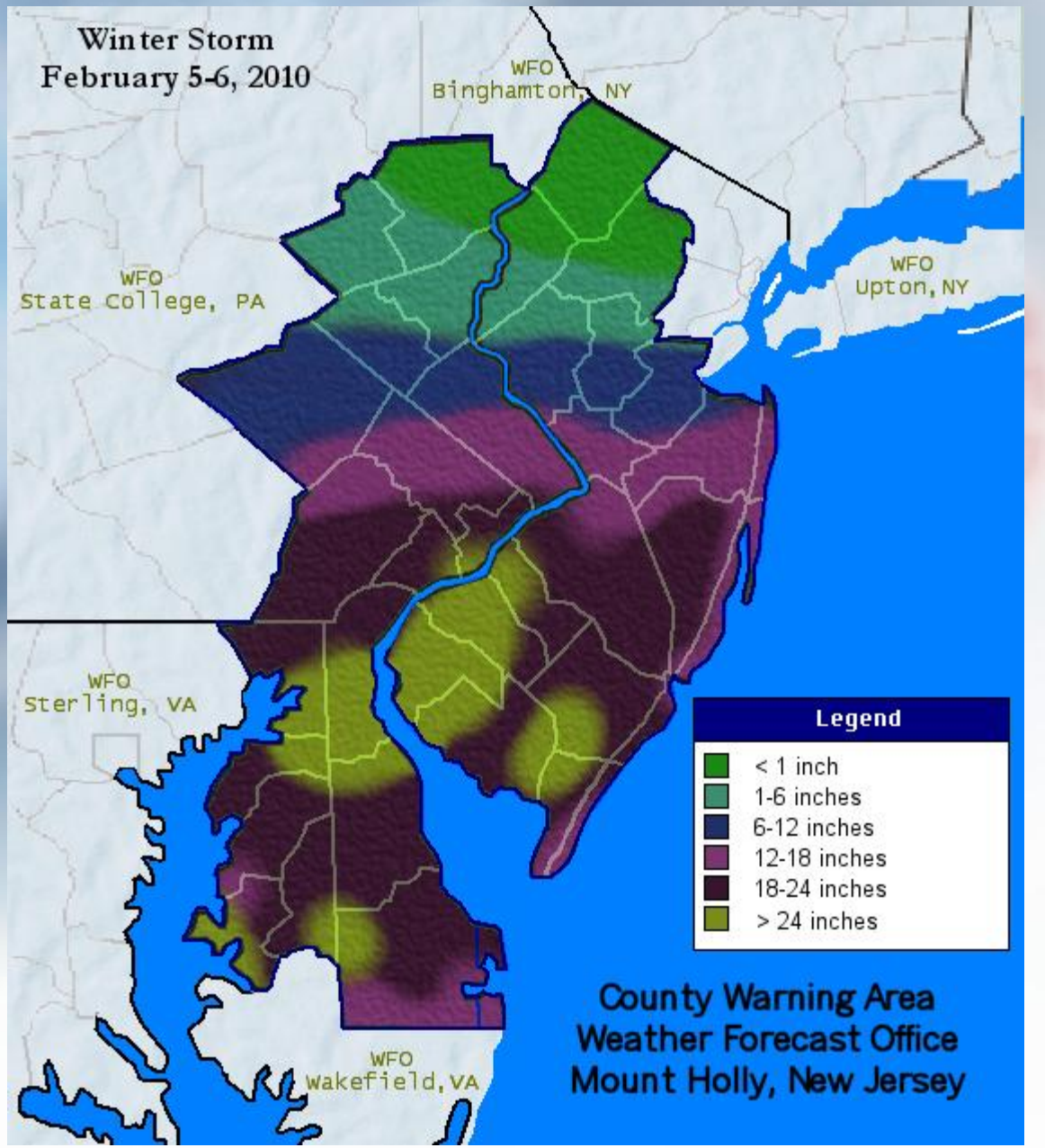
- Wind Chill Advisory Criteria:
  - -10 (-15) to -25 deg F depending on location

Winter Precipitation



Project ATMOSPHERE
AMERICAN METEOROLOGICAL SOCIETY

USA TODAY
The Weather Book



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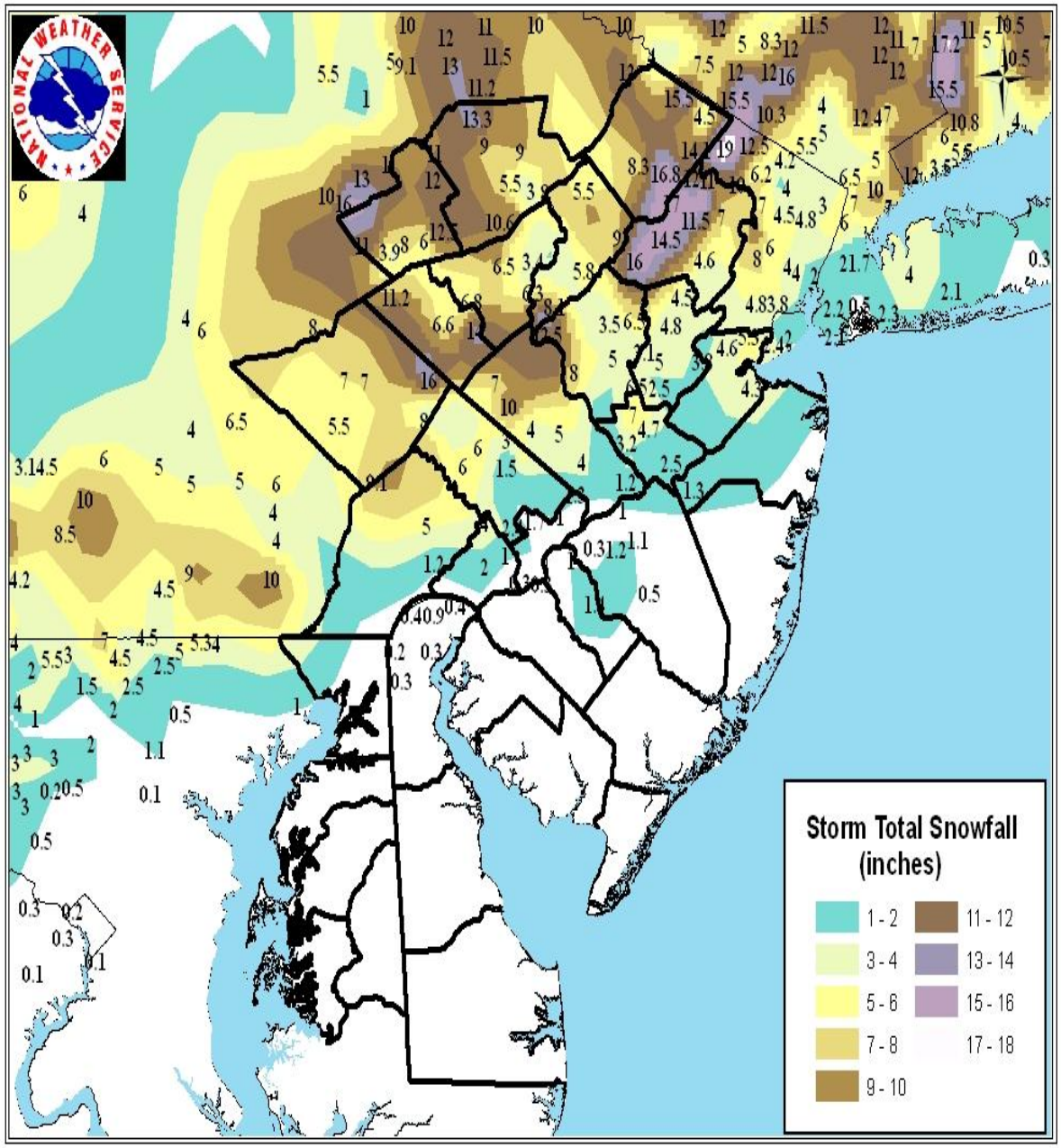
Storm Total Snowfall - October 29th 2011



What to report

- Winds estimated or measured to meet severe criteria…you can give us your peak wind gust too.
- Downed trees or wires
- Structural damage
- Injuries caused by the weather.
- Funnel clouds, wall clouds, tornadoes!
- Any hail that is falling or has fallen…especially an inch or larger.
- Any road flooding caused by heavy rains.
- Any rivers cresting their banks.
- Any Snowfall or Ice accretion.

How to report

- Call our office: 1-800-523-4129
- Give us your spotter ID
- Give us your location; try to be as detailed as possible.
- Give us time of event…on-going or how long it lasted.
- Report type of weather experienced…hail/wind/tornado, etc…

How we use your report.

- Helps to verify Warnings we have issued.
- Notify forecasters that a Warning needs to be issued if not already in effect.
- Help downstream residents that the storm may affect.
- Provide weather information to the general public

Quiz time!

Downburst or Tornado?

Downburst or Tornado?

Wall Cloud or Shelf Cloud?

Wall Cloud or Shelf Cloud?

Tornado?

Tornado?

Who to Contact for assistance

- National Weather Service Coordinator:
  - Larry Nierenberg -> Larry.Nierenberg@noaa.gov
  - Greg Heavener -> Greg.Heavener@noaa.gov
  - (609) 261 - 6602

- SkyWarn County Coordinator List:
  - http://www.erh.noaa.gov/phi/skywarn/coords.html

Other volunteer opportunity

- CoCoRaHS – Community Collaborative Rain, Hail & Snow Network

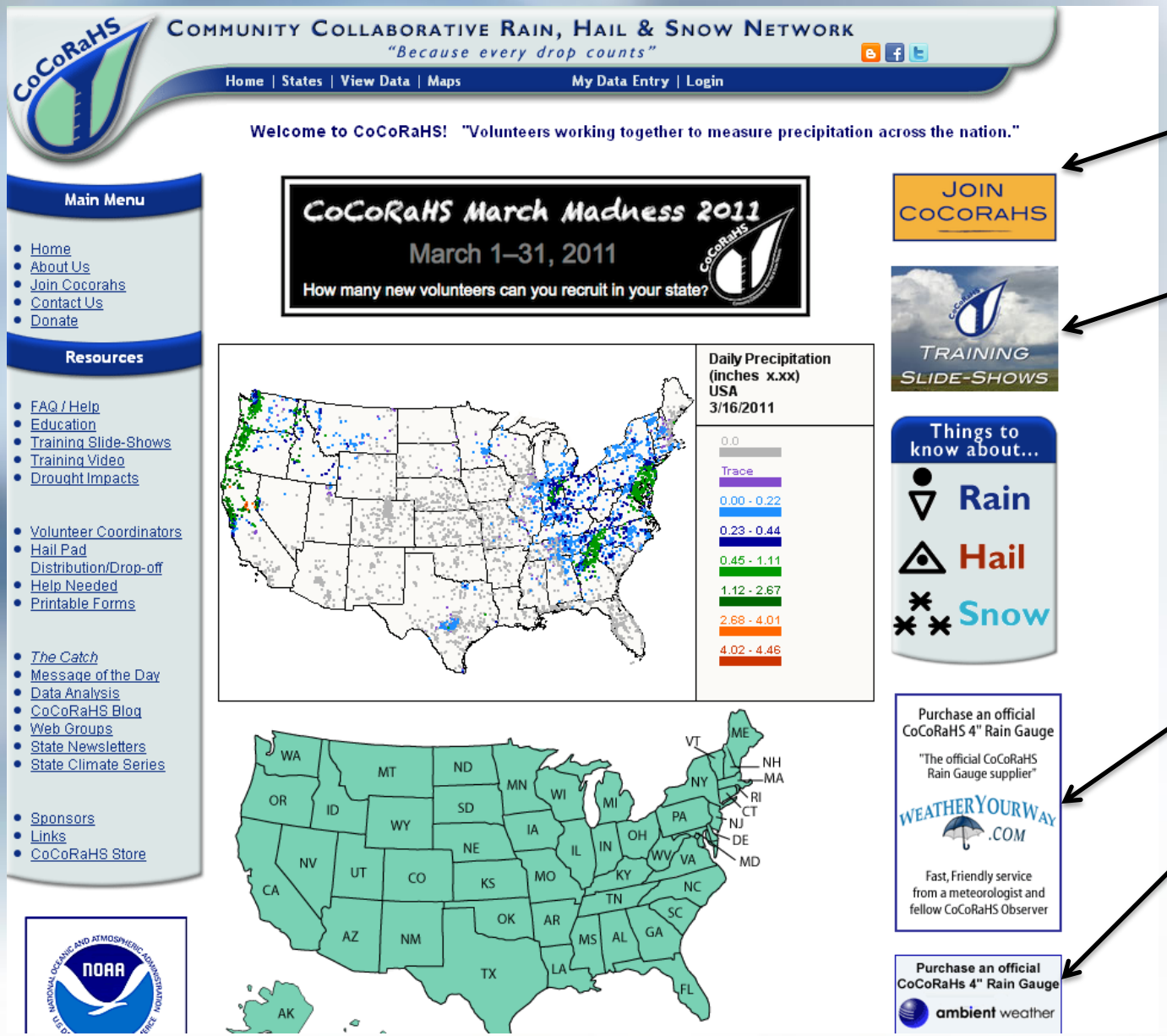
- www.CoCoRaHS.org – because every drop counts.

CoCoRaHS

- Mission of network:
  - provide accurate high-quality precipitation data for our many end users on a timely basis
  - increase the density of precipitation data available throughout the country
  - encouraging citizens to have fun participating in meteorological science and heightening their awareness about weather
  - providing enrichment activities in water and weather resources for teachers, educators and the community at large

CoCoRaHS – What you need

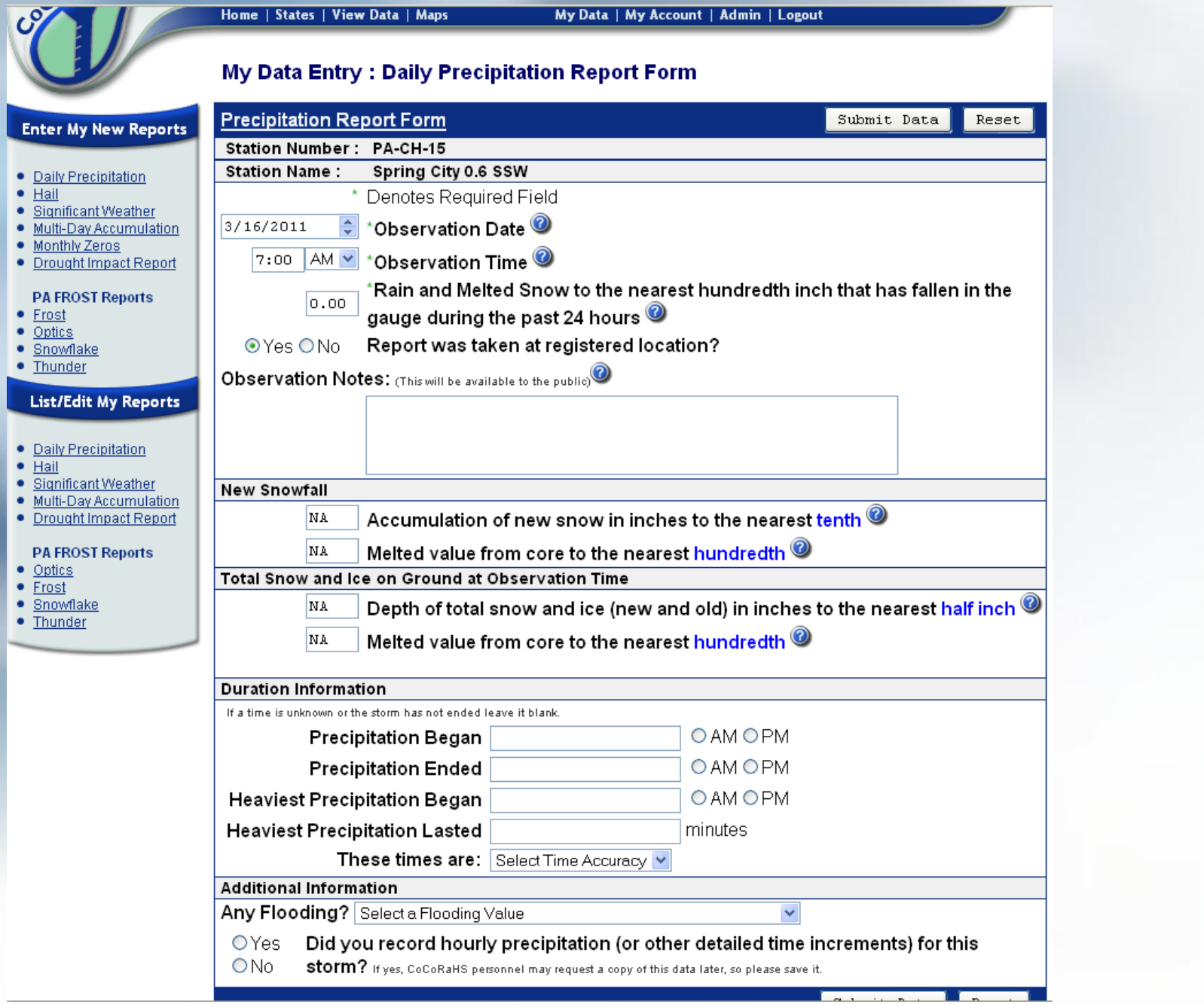
- An official 4” rain gauge
- Computer with internet access
- A couple of minutes everyday to measure rain/snow
- Desire to become active in a weather related community



How to sign up!

How-to guides.

Where to buy your gauge.



National Weather Service
Philadelphia/Mt. Holly

Thank you very much!